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Synopsis under the name, *Cladonia turgida* (Ehrh.) Hoffm. var. *conspicua* (Schaer.) Nyl. Addit. Fl. Chil. 147. 1855. The primary thallus is usually wanting, the podetia elongated and sometimes quite squamulose.

In closing some explanation of a few expressions used above will be helpful. Our sea-green is a grayish green or perhaps nearer a gray than a green. Single cells or hyphae which are hyaline, when seen collectively as in an hymenium or an hypothecium, are of a whitish color, which we have called pale. Paraphyses of *Cladonias* are hyaline except at the tips.

Even water will sometimes causes the coloring matter of the epithecium to diffuse through the hymenium, especially the upper portion, in sections. To avoid error from this source. sections must be examined as to color the moment after cutting.

Fayette, Iowa.

HEPATIC—LEJEUNEA.

WILLIAM C. BARBOUR.

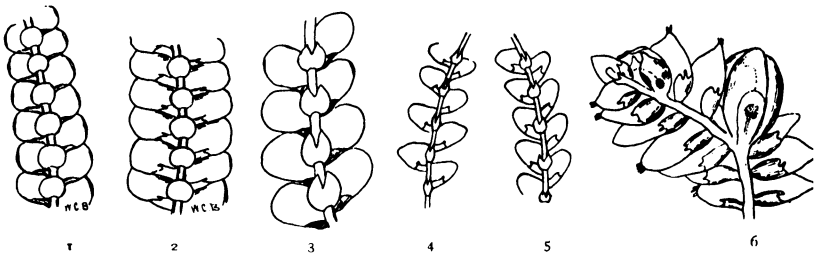


Fig. 1. *Archilejeunea clypeata* Fig. 2. *A. Sellowiana* Fig. 3. *Lejeunea Americana* Fig. 4. *Microlejeunea lucens* Fig. 5. *M. Ruthii* Fig. 6. *Cololejeunea Jooriana*

The genus *Lejeunea* was founded by Libert, and as such was accepted by Spruce and many other writers. If considered as a single genus it is a very large one, and was divided by Spruce into thirty-seven subgenera. Most of these were raised to the rank of genera by Schiffner when, in 1893, he issued the Hepatic part of Engler and Prantl's *Natur Pflanzenfamilien*.

We shall endeavor to adapt from older works a description of the genus which shall cover the composite *Lejeunea* as covering all these divisions. The descriptions of species are adapted and simplified from the monograph by A. W. Evans, of Yale University, published in Volume VIII., No. 2, *Memoirs of the Torrey Botanical Club*. Most of the illustrations were redrawn from the same source. Dr. Evans admits to the flora of the United States and Canada twenty-three species, of which about ten occur in the "Gray's Manual Region."

Of the thirteen species not here included, seven are found in various States of the South, including Florida; five in Florida only; and one, *Colelejeunea Macounii* (Spruce) Evans, occurs in British Columbia. Of the species here noted, one, *Lejeunea patens* Lindb. is found in Newfoundland and Nova Scotia. The other occurs at various points in the Northeastern States.

In temperate regions the number of species found is comparatively small, while in the tropics the genus reaches proportions which are alarm-

ing to the amateur. Many of our species of the extreme South are merely the northern limits of those which are common in the warmer regions of Mexico and the West Indies.

LEJEUNEA belongs to those leafy stemmed hepatics which have the bilobed leaves, or leaves folded together so as to make a dorsal and a ventral lobe. The ventral lobe in this genus is incurved, but not ligulate or saccate. The lower lobe is always smaller than the upper and is usually more or less inflated. It is separate from *Radula* in that the root hairs arise from the stem or underleaves, whereas in *Radula* they arise from the ventral lobes. Also in *Radula* the perianth is compressed while in *Lejeunea* it is angular. *Frullania* and *Jubula* have the ventral lobe saccate, while in *Porella* it is ligulate. The leaves are decurrent at the folds, and, in all but two of our northeastern species, underleaves are present. The perianth is free from the involueral leaves oval or oblong, terete or angular, and with the mouth carinate, cristate, or ciliate. Capsule globose. Spores large, tuberculate.

Our *Lejeunea* are rather smaller than the other genera which we have considered, except *Frullania*, which they greatly resemble in appearance to the unaided eye. In habitat, they grow at the base of trees, upon their bark, upon rotten logs, and some upon rocks. Sometimes species are mixed together, or mixed with other hepatics or mosses, so that care should be taken in identification.

KEY TO SPECIES.

1. Underleaves present, undivided.....2.
Underleaves present, bifid3.
Underleave absent.....8,
2. Lobule bluntly pointed at apex.....*Archilejeunea clypeata*.
Lobule with long and slender apical tooth
Archilejeunea Sellowiana.
3. Lobe acute, underleaves with rounded divisions, and broad shallow sinus.....*Harpalejeunea ovata*.
Lobe rounded or obtuse, underleaves obtuse to acute divisions, and narrow sinus..... 4.
4. Lobe widely spreading, inflorescens autoicous. 5.
Lobe obliquely spreading to suberect, inflorescence dioicous.....7.
5. Lobes and underleaves distinctly crenulate.....*Lejeunea patens*.
Lobes and underleaves entire or nearly so6.
6. Underleaves not rounded at base, perianth abruptly narrowed at base.....*Lejeunea cavifolia*.
Underleaves rounded at base, perianth gradually narrowed toward the base*Lejeunea Americana*.
7. Underleaves longer than broad, deeply bifid, often unidentate on sides.....*Microlejeunea lucens*.
Underleaves broad as long, bifid to middle, never unidentate on sides*Microlejeunea Ruthii*.
8. Outer surface of lobe rough from projecting cells or wart-like thickenings, no hyaline cells.... *Cololejeunea Biddlecomiae*.
Outer surface of lobe almost smooth, cells scantily convex, hyaline cells often present at apex and along antical margin.
Cololejeunea Jooriana.

ARCHILEJEUNEA CLYPEATA (Schwein.) Schiffn. (*Phragmicoma clypeata* Nees) (*Lejeunea clypeata* Sull.) Fig. 1.

Plant pale green, growing in broad mats; stems irregularly branched: leaves imbricated, dorsal lobe obliquely spreading, broadly oblong; apex rounded: margin crenulate from projecting cells: ventral lobe ovate-triangular, inflated, apex blunt, junction of lobes forming an obtuse angle: underleaves distant, orbicular, rounded at the apex, abruptly narrowed at base, very short decurrent: inflorescence autoicous or dioicous: female inflorescence borne on a principal branch; bracts complicate, unequally bifid, scarcely or not at all winged on keel, lobe obovate, rounded at apex, crenulate, lobule oblong, rounded at apex; bracteole ovate-oblong, narrowed at base, truncate or retuse at apex; perianth obovoid, truncate with a short broad beak, five keeled, keels roughened: male spikes on short branches, oblong; antheridia in pairs.

This species occurs on rocks and trees, and ranges from Connecticut to Georgia and Louisiana. It has been distributed in Musci Alleg. 262, and in Hep. Bor. Amer. 95, as *Phragmicoma clypeata*. Also in Hep. Am. 50, as *Lejeunea clypeata*.

ARCHILEJEUNEA SELLOWIANA Steph. (*Phragmicoma xanthocarpa* Aust.) (*Lejeunea velata* Gottsche.) Fig. 2.

Plants pale green or glaucous, in wide mats: stems closely appressed to matrix: leaves closely imbricated, the dorsal lobe widely spreading at nearly right angles with the stem, ovate-oblong, apex rounded, margin entire or nearly so, lower margin arching across stem; lobule inflated toward base, oblong, apex acuminate, sometimes curved, ending in a tooth three to eight cells long, two to four cells wide at base and with a single row of cells at apex; lobules on small branches often poorly developed: underleaves broadly orbicular to reniform, rounded, truncate or retuse at apex, rounded at base: inflorescence autoicous; female on short branch usually, bracts complicate, unequally bifid; perianth obovoid, half exserted, broad and truncate above, with short, narrow beak, five-keeled, keels roughened: male spikes similar to *A. clypeata*. Found on trees and rocks. Range from Rhode Island to Tennessee south to Florida and Texas. Distributed in Hep. Bor. Am. 95b. as *Phragmicoma xanthocarpa*.

HARPALEJEUNEA OVATA (Hook.) Schiffn. (*Lejeunea ovata* Tayl.) (*Lejeunea Molleri* Steph.)

Plants pale to dark green, loosely caespitose or scattered: stems prostrate, closely appressed: leaves contiguous or somewhat imbricated, lobe spreading, gradually narrowed beyond middle, apex often reflexed, usually acute, margin nearly entire; lobule (ventral lobe) strongly inflated, ovoid, keel strongly arched, crenulate from convex cells: apex with a single projecting cell: underleaves distant, broadly cuneiform, apex broad, truncate or emarginate with a shallow sinus, rounded or obtuse segments, margin entire: inflorescence dioicous; female on a leading branch: bracts as before; perianth obovate clavate, acutely five-keeled in upper part: male spike on short branch.

On trees and fallen logs. Virginia, Tennessee, and Georgia. It is also found in Western Europe, and the type specimen was collected in Ireland by Taylor. Fruiting material is rare. The acute lobes of its leaves and the emarginate-bifid underleaves with rounded divisions distinguish it from all other *Lejeunea* of the United States. In the tropics, however, it has an abundance of relatives.

LEJEUNEA PATENS Lindb.

Plants pale or dark green, slightly glossy when dry, caespitose: stems copiously branched: leaves imbricated, the lobe ovate, widely spreading, strongly convex, rounded and decurved at apex, margin distinctly crenulate from projecting cells, antical margin arching across the stem; lobule strongly inflated, ovate, mostly crenulate, apex tipped with a single blunt, projecting cell: cells of lobe convex: underleaves distant, about the size of or a little smaller than the lobules, orbicular, gradually narrowed to base, bifid about one-half, apex of lobes varying from obtuse to acute, sinus varying from acute to obtuse, margin crenulate: inflorescence autoicous; female sometimes on leading branch, sometimes on short one; perianth half exerted, oblong-obovoid, gradually narrowed toward base, rounded above and with short beak, terete below, sharply five-keeled above, keels crenulate from projecting cells, becoming blunter with age: male spike on short branch; antheridia in pairs. Found on rocks. Localities:—Ireland (type—Lindberg), Great Britain, Norway; and, in America, Newfoundland and Nova Scotia. May be found in northern borders of the United States, or in mountainous regions.

LEJEUNEA CAVIFOLIA (Ehrh.) Lindb. (*Lejeunea serpyllifolia*, Lib.) (*L. serpyllifolia* var. *cavifolia* Lindb.) (*L. serpyllifolia* var. *Americana* Lindb., in part.) (*Eulejeunea serpyllifolia* Schiffn.),

Plants pale to dark green, dull or glossy when dry, in tufts or creeping over other bryophytes: branches spreading, usually abundant: leaves imbricated, lobes ovate, obliquely spreading, rounded to obtuse at apex, margin entire or nearly so; lobule strongly inflated, ovate, scarcely crenulate: underleaves distant, as large as or a little larger than the lobule, ovate-orbicular, gradually narrowed toward base, neither decurrent or rounded, bifid about one-half with rounded to acute lobes, margin entire or nearly so: inflorescence autoicous; female on leading branch, sometimes on short branch; perianth about half exerted, oblong to oval-oblong from narrowed base, rounded or truncate at apex with short, slender beak, terete below, sharply keeled in upper part, the keels smooth.

This plant grows on rocks and trees. The range is from Ontario, New Hampshire and Pennsylvania, to Minnesota and Wisconsin. Has been distributed in Hep. Bor. Am. 97 (in part), and in Hep. Am. 8 (As *Lejeunea serpyllifolia*).

LEJEUNEA AMERICANA (Lind.) Evans (*Lejeunea serpyllifolia* var. *Americana* Lindb.—in part.) Fig. 3.

Pale, whitish or yellowish green, closely appressed or in depressed mats: stems irregularly pinnately branched: leaves imbricate, the lobe ovate, widely spreading, rounded to obtuse at apex, margin entire or

slightly crenulate; lobule inflated, ovate, scarcely crenulate, apex with a single projecting cell: underleaves contiguous or sub-imbricate, a little larger than lobule, orbicular, rounded or sub-cordate at base; bifid about one-half, segments usually acute or apiculate, occasionally obtuse, sinus acute to obtuse, margin entire or sinuate: inflorescence autoicus; female on leading or short branch; perianth obovoid, often distinctly dilated above middle, gradually narrowed toward base, broad and truncate above, and with a short beak, terete below, sharply five-keeled above, keels smooth: male inflorescence usually on short branch: spores greenish, angular, thick-walled. Grows on trees. Ranges from North Carolina to Florida, westward to Louisiana and Texas. Has been distributed in Drummond's Southern Mosses 171, in part; Musc. Allegh. 272 (as *L. serpyllifolia*); Hep. Bor. Am. 97, in part (as *L. cavifolia*); Hep Am. 98 (as *L. Austini*.); Hep. Amer. 137 (as *L. lucens*.).

MICROLEJEUNEA LUCENS (Tayl.) Evans (*Lejeunea lucens* Tayl.) Fig. 4.

Pale green, scattered or in turfs: leaves distant to imbricated, lobe obliquely spreading, ovate, apex rounded varying to obtuse, margin entire or subcrenulate from projecting cells; lobule half as long as lobe, strongly inflated, ovoid; lobule often poorly developed: underleaves distant, ovate narrowed toward base, not decurrent, bifid to about the middle, with subulate to acuminate divisions ending in a single cell or in a row of two cells, sinus narrow and obtuse: inflorescence dioicous; female on short branches; bracts complicate, nearly equally bifid; perianth scarcely exerted, broadly pyriform, slightly compressed, five-keeled, the keels smooth, the beak short: male spike julaceous, at base of an elongated branch. On trees or moist rocks. Virginia, Florida, Mississippi, Louisiana. Throughout tropical America. Was distributed in Sull. Musci Alleg. No. 274, as *Lejeunea cucullata*; and in Hep. Bor. Am. No. 98, under same name.

MICROLEJEUNEA RUTHII Evans Fig. 5.

Pale or dull green, scattered or loosely caespitose, sparingly and irregularly branched, the branches widely spreading: leaves distant to loosely imbricated, the lobe obliquely spreading to suberect, ovate or broadly ovate, rounded at apex, margin nearly entire, sometimes slightly angular-sinuate; lobule half the length of lobe, strongly inflated, ovoid, apex tipped with a single projecting cell which is sometimes outwardly curved: underleaves distant, orbicular, narrowed toward base, and neither rounded nor decurrent, bifid to about middle with broad, suberect, triangular lobes and obtuse sinus, lobes acute, ending in single cell or row of two cells, margin entire or subcrenulate from the projecting cells, lateral margins rounded: inflorescence dioicous; female on a leading branch, bracts complicate, deeply and unequally bifid; bracteole free, ovate from an abruptly contracted base: perianth and male inflorescence as yet unknown. Known only from the type locality, Big Frog Mountain, Tennessee. The original description is in Mem. Torr. Bot. Club, 8:161. 1902. The species is near *M. ulicina* Tayl. of Europe. It somewhat resembles *M. lucens*, from which it may be distinguished by the less widely spreading lobes of its leaves, smaller cells with thicker walls, broader underleaves, which have broader segments and are

never unidentate on sides, by male spike on leading branch instead of short branch.

COLOLEJEUNEA BIDDLECOMIAE (Aust.) Evans (*Lejeunea calcarea* of Sull., not of Libert.) (*Lejeunea echinata* of Aust., not of Taylor.) (*Lejeunea Biddlecomiae* Aust.)

Pale or bright green, scattered or depressed caespitose: irregularly pinnately branched: leaves distant to imbricated, lobe obliquely to widely spreading, ovate, apex varying from rounded to acute, usually obtuse, margin crenulate or denticulate from projecting cells; lobule inflated, ovoid to globose, keel bearing an obtuse, sometimes indistinct tooth beyond the middle, and another tooth composed of two cells midway between this tooth and end of keel: stylus conspicuous, composed of two to ten cells in a single row, sometimes two cells broad a part of its length; inflorescence dioicous or autoicous; female on a leading branch, bracts unequally bifid, the lobe obliquely spreading, broadly ovate; perianth partly exserted, obovoid to oblong, not compressed, rounded to truncate at the apex, with a short beak, sharply five-keeled in upper part, surface roughened from projecting cells, except near base: male spikes on leading branches; bracts similar to leaves, but with proportionately larger lobule; antheridia singly or in pairs. On trees and rocks. Range from Ontario and Massachusetts to Alabama and Florida. Distributed in Sull. Musci Allegh. 275 (as *Lejeunea calcarea*). Aust. Hep. Bor. Am. 99 (as *Lejeunea echinata*). Hep. Amer. 51 (as *L. calcarea*) Can. Hep. 13 (as *L. calcarea*). Found best developed on trees especially in swamps. A tiny species, when dry hardly noticeable to the unaided eye; leaves $\frac{1}{3}$ mm. long.

COLOLEJEUNEA JOORIANA (Aust.) Evans. (*Lejeunea Jooriana* Aust.) Fig. 6.

Yellowish green or whitish, darker with age, scattered or loosely caespitose: irregularly pinnately branched: leaves imbricated, lobe widely spreading, ovate, gradually narrowed from just below middle to the rounded, obtuse or subacute apex, margin entire or subcrenulate; lobule inflated, ovoid, free margin with two teeth as in last species; stylus inconspicuous and soon obsolete, composed of two cells in a row or even of a one-celled papilla; cells scarcely convex; hyaline cells at apex one to ten in number, elongated, usually in a single row, their ends usually free, hyaline cells sometimes also along the antical margin, usually becoming indistinct with age; inflorescence synoicous or sometimes paroicous; female usually on a leading branch, rarely on short branch; bracts similar to leaves, with more or less inflated lobule, stylus three to four cells long sometimes; perianth half exserted, broadly ovoid to obvoid, rounded at base, rounded, truncate or slightly retuse at apex, with extremely short and indistinct base, somewhat flattened, antical face plane or with broad, low keel, lateral keels sharp to blunt, postical keel broad and two angled: antheridia borne singly or in pairs in the axils of the female bracts; spores elongated, angular, greenish. On bark and reed. North Carolina, Florida, Louisiana, Differs from *C. Biddlecomiae* in its ordinary leaf cells which are plane or nearly so, also in its inflorescence, hyaline cells, and much shorter stylus.

Sayre, Pa.